SACRAMENTO STATE
Construction Management

CM 21
Construction Graphics
Course Syllabus
Fall 2008

Instructor: Professor Keith Bisharat

Lecture: Tuesdays and Thursdays 8:00 AM – 8:50 AM
208 Brighton Hall
Lab 1: Tuesday 9-11:50 AM
Lab 2: Thursday 9-11:50 AM
4003 Riverside Hall

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Office hours by appointment
4024 C Riverside Hall

CM 21 – Construction Graphics

Course Description
This course consists of instruction and exercises in graphic communication applicable to construction. Students will learn to analyze civil, architectural, structural, mechanical and electrical drawings and extract the information they need to identify and describe various construction components orally, graphically, and in writing, and to perform material quantity surveys.

Prerequisites
CM 20 (Construction Materials and Processes) and competence in the fundamentals of technical drawing (Engineering 4 at CSUS) or the express permission of the instructor and Program Coordinator are the prerequisites for this class. Students must demonstrate their competence in the prerequisite course materials to be admitted to this class.

Academic Honesty and Grading System
All students are subject to the policies described in the University Catalogue. In particular, students should be familiar with policies described on pages 81-91, pages 98-106, and pages 328-331 in the 2006-2008 CSUS Catalogue. Any instance of academic dishonesty will result in a grade of "F" for the course and all other sanctions as applicable under the current university policy. Academic dishonesty includes, but is not limited to, copying another student's work or using a computer or cell phone to access information when their use has been prohibited.

General Course Objectives
Generally, this course is designed to demonstrate the value of drawings to the construction professional. Among other things, students will learn how a set of construction drawings is organized, where to find specific information about a project, and how construction professionals use the information. ***Listening, speaking, and drawing*** skills will be regularly exercised in this course.

Specific Learning Outcomes
After completing this course, students should be able to:

1. List and describe the elements of planning
2. Accurately list the elements making up a simple construction component, using the correct terminology
3. Translate the graphic description of construction components into words, and vice versa
4. Produce multi-view, isometric, and oblique drawings and describe the appropriate application of them
5. Define plan views; exterior, interior, and framing elevations; and detail, wall, and building sections and their shortcomings
6. Identify the limits of two and three dimensional depictions of construction elements, components, and assemblies
7. Produce accurate free-hand sketches of simple construction components
8. Use architectural, engineering, and metric scales to determine the planned sizes of elements, components, and systems in construction
9. Properly dimension the components that make up a simple structure
10. Develop a topographic map from a survey grid using mathematical and graphic interpolation techniques.
11. Produce site sections and describe their value to the constructor

12. Explain and interpret utility profiles
13. Perform simple quantity surveys for earthwork, foundations, structural framing, roofing and flashing, mechanical equipment and ductwork, plumbing, electrical work, and finishes in standard US units as well as SI (metric) units
14. Describe the role of the design professional in the project development process
15. Describe the various roles that the constructor plays in construction projects
16. Work productively individually as well as a member of a team
17. Produce a detailed framing model of a building project after clarifying the team work scope, estimating the required materials, determining the schedule, and coordinating the team's work with other construction teams

Textbook (Required)

Bisharat, Keith A. (2008). *Construction Graphics: A Practical Guide to Interpreting Working Drawings, Second Edition.* John Wiley & Sons, New Jersey; ISBN 978-0-470-13750-5

The University library contains copies of the first edition of the required text, and will put one new copy in the reserve book room. Students who choose not to purchase this text are nonetheless required to complete the assigned work.

References

Edward Tufte: *Beautiful Evidence, Visual Explanation, Envisioning Information, The Visual Display of Quantitative Information*, Graphics Press LLC
Allen, Edward: *Architectural Detailing – Function, Constructability, Aesthetics,* (either edition) John Wiley & Sons
Allen, Edward: *The Architect's Studio Companion,* John Wiley & Sons
Architectural Graphics Standards, 10th edition, John Wiley & Sons.
Ching, Frank: *Design Drawing,* John Wiley & Sons
Giesecke, Mitchell, Spencer et al. *Technical Drawing, 10th edition, Prentice Hall*
Leibing, Ralph: *Architectural Working Drawings,* John Wiley & Sons
Muller, Fausett, and Grau: *Architectural drawing and Light Construction.*
Wakita and Linde: *The Professional Practice of Architectural Detailing,* John Wiley & Sons
Wakita and Linde: *The Professional Practice of Architectural Working Drawings,* John Wiley & Sons

Materials and Equipment (Required)*

Half-sized set of drawings (project to be announced). The drawings will be available in the vault at Brownie's Blueprints, 13th and V streets in downtown Sacramento. Ask for them by project name at the customer counter or via telephone. Printing costs vary, so ask for the least expensive drawing type and for a CSUS student discount. Allow several hours for the drawings to be copied. Ordering drawings by telephone prior to a trip to Brownie's is recommended. (See contact details below.) **The following equipment is required, unless noted otherwise:**

- Bound sketchbook (8 ½" x 11"), available at most bookstores and drawing supply retailers. The book should have at least 100 blank pages in it, and you should be prepared to fill it with sketches and assignments
- Architectural, engineering, and metric scales (those that are triangular in section are best)
- Mechanical (0.05mm and 0.09mm) or wood pencils (minimally, a 3H or 4H pencil for outline work, B or No. 2 for most sketching, and 2B, 3B or 4B for bold dark lines).
- A portable pencil or lead sharpener, if mechanical pencils are not used
- White plastic eraser
- One medium-sized 30°/60°/90° triangle and a medium-sized 45° triangle

** Drawings, materials, and equipment are required by the third class at the latest*

Materials and Equipment (Suggested)

- Compass
- Template of ellipses
- Erasing shield, dust brush
- Adjustable triangle

Drafting equipment is available at the **Hornet Bookstore** (recently completed by '93 CSUS grad Rich Miller, project manager, Roebbelen Contracting), at office supply stores such as **Office Depot**, **Office Max**, **Staples** and the following:

University Art
2601 J Street, Sacramento, CA 95816
(916) 443-5721

California Surveying & Drafting
4733 Auburn Blvd., Sacramento, CA 95841
(916) 344-0232 or (800) 243-1414
Fax: (916) 344-2998

Brownie's Blueprint
1322 V Street, Sacramento, CA 95818
(916) 443-1322 or (800) 942-COPY (2679)

Utrecht Art Supply Center
1612 Howe Avenue, Sacramento, CA 95825
(916) 641-6400

Course Organization

Class sessions of fifty minutes in length will be held twice weekly. A laboratory of 2 hours and 50 minutes will be held once weekly. Course time will be devoted to a combination of lecture and work on selected exercises and/or drawings. Quizzes will be given every week for 10 weeks starting in the second week of the semester.

Fundamental drafting skills are reviewed in the first few class meetings, followed by analyses of construction drawings in a sequence that approximates how buildings are constructed. The course requires students to learn by doing. Some exercises can be completed during the scheduled class period, while others will require more than one lab period and may require work outside the class. Assignments build on one another; students are encouraged to keep current. Academic work, like physical exercise, requires activity—one must do to accomplish. The people who hire graduates of the Sac State CM Program have all earned their positions through diligence and hard work, and the one thing they will not tolerate is a lack of effort.

Evaluation of Students' Performance

Course grades will be based on 5 quizzes and a final project (scale model). Student work will be evaluated for technical content, clarity, thoroughness, and accuracy. The scale model, to be constructed in teams, will be evaluated on planning, accuracy, completeness, and neatness. Students are expected to know their model well and should be able to answer on-the-spot questions during their presentations. Students will be required to evaluate their own performance, as well as that of their teammates. These evaluations will be factored into the semester grade. Students are required to complete all assignments and submit a completed sketchbook including: 1) assignments designated by the instructor; 2) drawings of the student's choice; and 3) purposeful "doodles." Students must do all the work assigned and must submit their completed sketch books no later than November 27, 2007, in order to receive a semester grade. Late assignments will not be accepted; exceptions will be made for documented medical and family emergencies.

Grades will be weighted as follows:

Quizzes	85%
Final Project	15%
Total	**100%**

Grading

Grades will be assigned in accordance with the grading policy of the university as outlined in the section entitled “Grading System” in the current copy of the university catalog.

All students are required to submit a neatly compiled three-ring binder, with divider tabs, all course notes, assignments, handouts, quizzes, exams, and other course work. Binders will be returned to the students following the ACCE accreditation visit in Spring 2009. Failure to produce a binder will result in a failing grade in the class.

Note: If you have any questions, please contact the CM Program Coordinator

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Tentative Instruction Schedule for Fall 2008[1]

Week	Date	Topic	Chapters
1	9/2	Introduction – review syllabus, record class goals **(P1)**[2] (proficiency exam)	1, 2
	9/4	Equipment, lines, lettering, assignment format**, (P2)**	3, 4
2	9/9	Graphic conventions: scale, symbols, dimensioning; **(P3)**	4
	9/11	Projection types	4
3	9/16	Sketching techniques; **(P4)**	5
	9/18	Sketching techniques; **Quiz 1**	
4	9/23	Topographic maps; ("Figgess); (**P5)**	4, 6
	9/25	Interpreting construction drawings, **(P6)**	Ppg. 56-60;401-405
5	9/30	Interpreting construction drawings, topographic maps (review), earth quantity take-offs (Introduction):	6
	10/2	Interpolation, site sections,; **Quiz 2; (P7)**	Appendix G
6	10/7	Earth quantity take-offs	7
	10/9	Foundation drawings; **(P8)**	
7	10/14	Framing drawings, concrete take-offs; **Quiz 3**	8
	10/16	Framing drawings;	8
8	10/21	Framing drawings	8
	10/23	Building and wall sections;	9
9	10/28	Roof plans, sections, and details	10
	10/30	Roofing and flashing take-off	10
10	11/4	Interior construction, finishes,	11
	11/6	Mechanical drawings – plumbing and piping; **Quiz 4**	12
11	11/11	Mechanical drawings – HVAC, take-off;	12
	11/13	Electrical drawings;	13
12	11/18	Scale model assigned; field trip (lab) **Quiz 5**	
	11/20	Scale model scope letter due; complete sketchbooks due field trip (lab)	
13	11/25	Scale model estimate and schedule due	
	11/27	**THANKSGIVING HOLIDAY**	
14	12/2	Scale model construction	
	12/4	Scale model construction	
15	12/9	Scale model construction	
	12/11	Scale model presentations – (lecture and lab)	

[1] Updated October 29, 2008

[2] P stands for "problem" and the number following letter designates the specific assignment